Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- Miscellaneous Books
Notebook N-17-02-27

This notebook was used by Jerry T. Chesler in February 1917 for notes on experimental work done for the U.S. Navy. The first part of the book contains notes pertaining to arc transmitters and attempts to transmit sound using coils, a spark gap, and a telephone diaphragm receiver. The notes indicate that Chesler's work was carried out under Edison instructions and oversight. The second part of the book [unselected] contains accounting records. The pages are unnumbered. Approximately 25 pages have been used.

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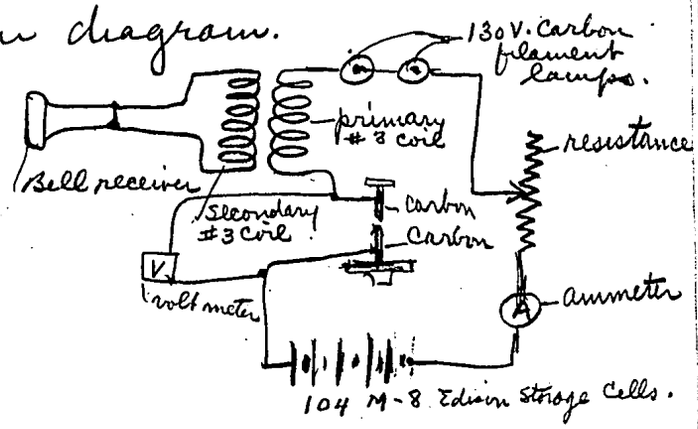
2/27/17

Experiments with Arc Transmitter

Set up arc transmitter in room #3 in Galvanometer building with connections as shown in diagram.



The upper spindle of arc was revolved by means of a silk cord which served as a belt — over a grooved pulley on one

of our standard dictating machine motors with resistance, which gave a range of speed on spindle of 100 r.p.m to 2600 r.p.m.

Found a small arc could be maintained across carbon points with 50 milli-amperes of current. The speed at which the carbon point rotated did not seem to affect the arc although it made quite a difference in the frequency of the clicks due to spindle not running absolutely true.

The arc across carbons could not be maintained longer than 30 seconds after which time the upper carbon had to be lowered to cut down the gap.

Another source of trouble which developed was poor contact of spindle to frame due to the film of oil in the upright bearings. This is now being remedied by putting a brush on frame to contact on spindle. The spindle is also being trued up to give more

uniform action.

The tests for aplification were laid over until the above changes are completed.

Experiments with arc transmitter.

(1) With same connections as shown on first page, the arc was adjusted to give a tiny spark while spindle was revolving about 300 r.p.m. This gave a loud clicking sound in the receiver. Tried talking into transmitter, but this only increased or decreased the volume of the clicking sounds. The arc gave out frequently and had to adjusted practically all the time. The ammeter showed 50 milli-amperes in primary circuit while the voltage across the arc varied from 10 to 90. volts.

The speed was varied from 100 up to 2500 r.p.m. but this only seemed to vary the frequency of the clicking noises.

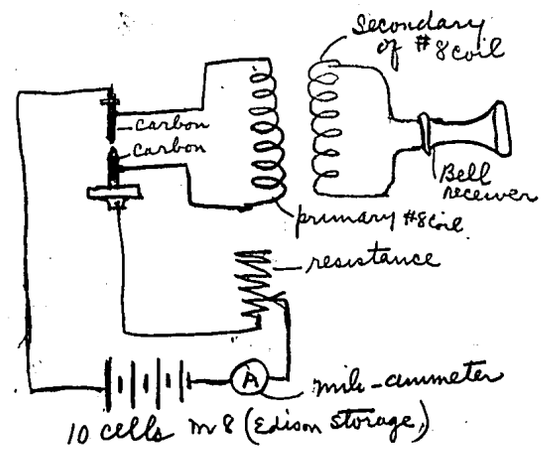
(2) Tried the same experiment as above but using our

number 8 coil instead of the number 3 coil. The results were about the same with the exception that all sounds were slightly louder.

(3) For this experiment a line was run up from galvanometer room to third floor of Lab. in order to remove receiver from noise in room.

Mr. Dawson listening at receiver end reports continual loud clicking noises when no talk is going on at transmitter end and increased volume and intensity of clicking noises when talk is going on although he could not make out what was being spoken.

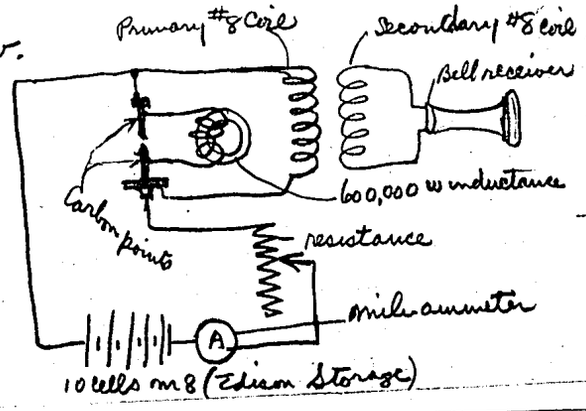
(4) The rotating arc was now connected up as per diagram below.



The results with above connections

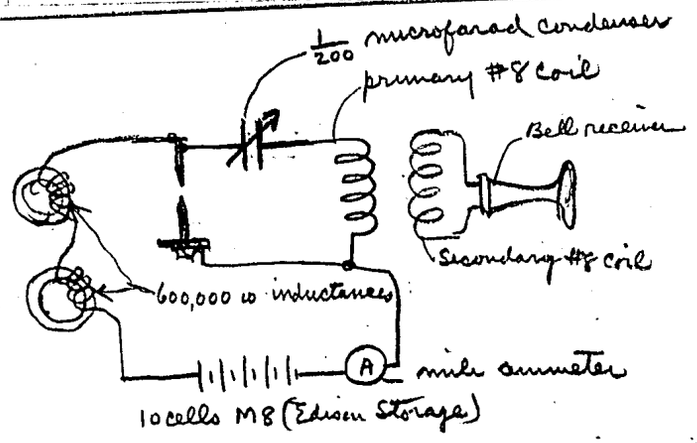
were about the same as in experiment #2. The same difficulty was encountered in holding the arc without frequent adjustments. The current across arc in this case also measured 50 milli-amperes.

(5) Following Mr. Edison's suggestion a high inductance was shunted across arc as shown in diagram below.



With apparatus connected in this manner it was possible to maintain an arc across the carbons for 15 or 20 minutes. The arc also responded more readily to sounds, or became slightly more sensative, but it was still impossible to hear what was being spoken thru it.

(6) Making further use of the inductance but connecting it in series with the arc as shown in diagram on other side of this page, it was possible to



maintain an arc across carbon points with only $3\frac{1}{2}$ milli-amperes. and the arc became still more sensative to sound. The clicking noises were diminished slightly and the arc remained fairly constant for a long time. It was still impossible to make out at the receiver end what was being spoken across the arc.

This utter absence of articulation might be due to the construction of the instrument, That is, the arc which is very tiny and bridges a gap probably a good deal smaller than $\frac{1}{1000}$ of an inch, does not allow the diaphram the full movement, in other words the arc is closed as soon as you talk into it and a further pressure on the points does not vary the

resistance enough to make
the receiver diaphragm
respond to the change.